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## Computer Hardware & Software **Building A Greener Grid**

Andy Greenberg, 08.21.07, 6:00 AM ET

The Internet doesn't produce belching smokestacks or toxin-spewing drainpipes. Instead, the environmental impact of the data centers that power the Web and private networks is about as visible as the electrons moving around a company's servers.

But visible or not, the ecological and economic costs of those servers are massive. A report released last week by the Environmental Protection Agency estimated that U.S. data centers (collections of computers used to power businesses' and government agencies' IT infrastructures and Web sites) consumed around 61 billion kilowatt-hours in 2006 at a cost of about \$4.5 billion. That's about 1.5% of total U.S. electricity consumption, more than the electricity used by American televisions, or equivalent to the output of about 15 typical power plants.

As the Internet expands and data centers multiply, networking hardware is only getting more power-hungry. U.S. server energy consumption is more than twice what it was in 2000, the EPA's report says, and by 2011, it's expected to nearly double again.

### **In Pictures: Cut Your IT Energy Costs**

But there's also good news: In an industry where yesterday's servers are tomorrow's doorstops, that data center power-crunch could potentially be outpaced by innovation. Moore's Law, which states that computing power doubles every two years, also applies roughly to server efficiency, says David Douglas, Sun Microsystems's vice president of eco-responsibility. That means new, energy-saving servers quickly pay for themselves.

"It turns out there are a lot of gains to be made from easy, low-hanging-fruit projects," says Douglas. He describes a server upgrade on one of Sun's own data centers last June that turned 22 outmoded servers into 11 modern machines, whose processors run at a slower speed but are capable of far more simultaneous tasks. That test case cut the center's energy use by about 93%, saving Sun about enough to recoup the project's \$300,000 cost in just three years.

And Sun isn't the only company who could benefit. Instead of growing, U.S. data center energy costs could actually be slashed by as much as 55% if state-of-the-art technology was fully implemented, according to the EPA.

The biggest hope for that technological transformation may be a process called virtualization. Most traditional servers do nothing for about 90% of their lives and continue to burn about half their peak energy consumption even while idle. Virtualization turns each of those underperforming machines into pieces of software and packs them together on a single physical server that runs continuously.

The savings from that consolidation can be dramatic. "The result is that a hundred physical servers turns into seven," says Steve Kaplan, chief executive of the IT consultancy AccessFlow. "That means you eliminate the energy use of 93 servers, the air conditioning you would have used to cool them, the back up generators for them, even the lighting you needed in the bigger data center."

For every server that's virtualized, a company saves around \$560 a year, according to VMware, the fast-growing technology company that pioneered the process. Three California power companies are also offering cash rebates for every server its customers remove through virtualization.

"The Googles of the world are growing up, and using more online applications than ever," says Mark Bramfitt of Pacific Gas and Electric, which offers its customers rebates of as much as \$300 per virtualized server. "There are phenomenal opportunities for energy conservation. These data centers use 50 to 100 times the power per square foot of an office building."

In fact, Google and PG&E are two of the big names that launched an environmental technology consortium in June known as Climate Savers Computing Initiative. The group, which also includes Yahoo!, Intel, Hewlett-Packard, Dell, Sun Microsystems and Advanced Micro Devices, aims to drastically cut the energy wasted by computing devices, with the goal of cutting greenhouse gas emissions by 54 million tons a year and saving \$5.5 billion in energy costs by 2010.

More recently, a somewhat overlapping group of tech heavyweights called the Green Grid, including Intel, HP, Dell, Microsoft, IBM, Sun and AMD, announced a "roadmap" for the IT industry's adoption of more efficient data center hardware. Jim Pappas, Intel's representative to the group, says the group's recommendations still haven't been decided; the goal for now is to develop rigorous standards for green IT infrastructure.

"Meaningful metrics are what really matter," Pappas says. "When you can see a car's mileage, it really changes the way you think about buying. It causes competition and innovation."

But Bogomil Balkansky, director of product marketing for virtualization company VMware, is even more ambitious. "Instead of incremental

improvements, we want to get rid of servers in a wholesale fashion," he says. "People talk about increasing car mileage. But imagine if we could remove millions of cars from the highway altogether."

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*Additional reporting by Sonia Narang.*

